

Mapping Things Out

The AISC *Seismic Provisions* are relatively new to many parts of the U.S., so we've developed a few graphics to show you how and where to apply them.

WHAT WAS ON NEARLY EVERY ENGINEER'S MIND AT THIS YEAR'S STEEL CONFERENCE?

AISC's Steel Solutions Center (SSC) staff had a fully functioning SSC answers desk at NASCC: The Steel Conference in San Antonio this February to find out. We answered questions via e-mail, as always, but we also answered countless questions on the spot.

So what *was* on everyone's mind in San Antonio? A lot of attention was focused on the new 13th Edition *Steel Construction Manual* and connection details, but there was also remarkable interest in seismic design and detailing.

Not only were people asking us questions at the SSC desk and in the AISC booth, but over 150 people showed up to hear about the upcoming *Seismic Manual* and 2005 *Seismic Provisions for Structural Steel Buildings* at 3:30 on a Friday afternoon! Now that's dedication to learning!

With the adoption of IBC 2000 and now IBC 2003 across the country, more and more engineers are working with the AISC *Seismic Provisions* for the first time. The lateral system of a steel-framed building designed using the AISC *Seismic Provisions* is designed to behave inelastically in a predictable and controlled manner when subject to significant ground motion. Accordingly, the *Provisions* place limits on the compactness of members in the system, require system configurations with predictable yielding of certain steel elements, and set requirements for design and detail of systems, members, and connections. As with all high-seismic construction, there is a cost impact when compared to the systems that have been common in wind and low-seismic applications.

So when do you need the enhanced performance and ductility in your steel system?

In Seismic Design Categories (SDC) A, B and C, Section A.9.8 of SEI/ASCE 7-02 permits two options for steel structures:

1. An *R* factor greater than 3 can be used as set

forth in Table 9.5.2.2 when the structure is designed and detailed in accordance with the requirements of the AISC *Seismic Provisions for Structural Steel Buildings*.

2. An *R* factor equal to 3 can be used for "Structural Steel Systems not Specifically Detailed for Seismic Resistance" in Table 9.5.2.2. This means that the system is designed and detailed as required in the AISC *Specification for Structural Steel Buildings*, but not the AISC *Seismic Provisions*.

The second option will result in higher forces on the system, but it is often more economical to design the system for higher forces than it is to follow the design and detailing requirements in the AISC *Seismic Provisions*.

In SDC D, E and F, only option 1 from above is permitted. In many cases, in SDC A, B and C designers can choose to use an *R* = 3 system and avoid using the AISC *Seismic Provisions*. The Steel Solutions Center created the maps shown in Figures 1 and 2 (next page) to give designers a feel for where in the country a steel building will be in SDC D, E or F based upon two of the three factors that affect classification: site acceleration and soil conditions.

The darkest blue areas indicate that the building will be SDC D, E or F for any soil condition. As the shade of blue gets lighter the soil classes that will produce SDC D, E or F are reduced.

The gray area indicates that no soil class, except for F, will produce SDC D, E or F. Site specific spectra analysis is required if the Soil Site Class is Type F and therefore cannot be mapped.

The SDC is determined from a combination of the Soil Site Class (SSC), the Seismic Use Group (SUG), and the mapped response spectra. The boundaries on the maps were determined for each SSC and SUG based on the mapped spectral response accelerations for short and one-second periods obtained from Figure 9.4.1.1a through 9.4.1.1j in SEI/ASCE 7-02.



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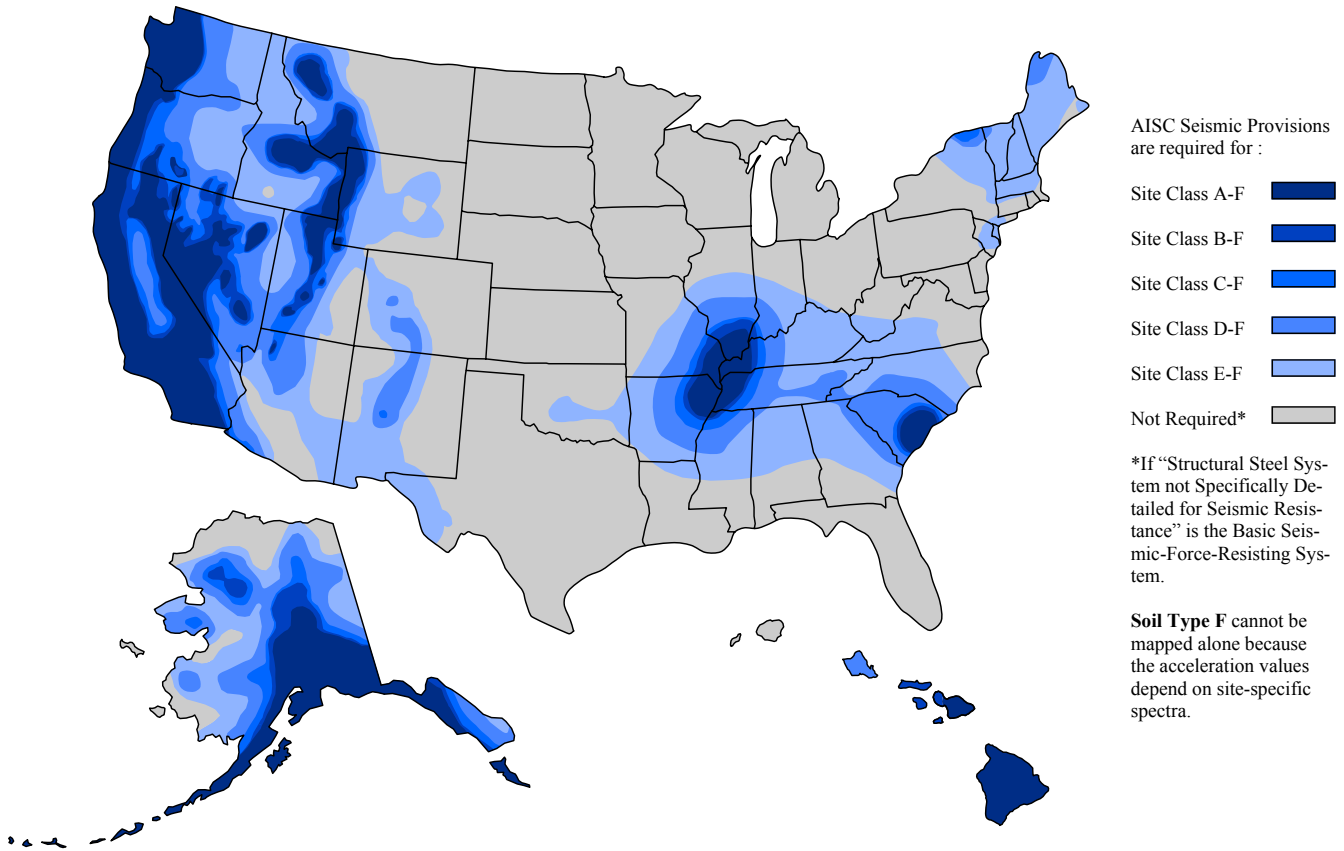


Figure 1: AISC Seismic Provision Requirements Summary for Seismic Use Group I and II

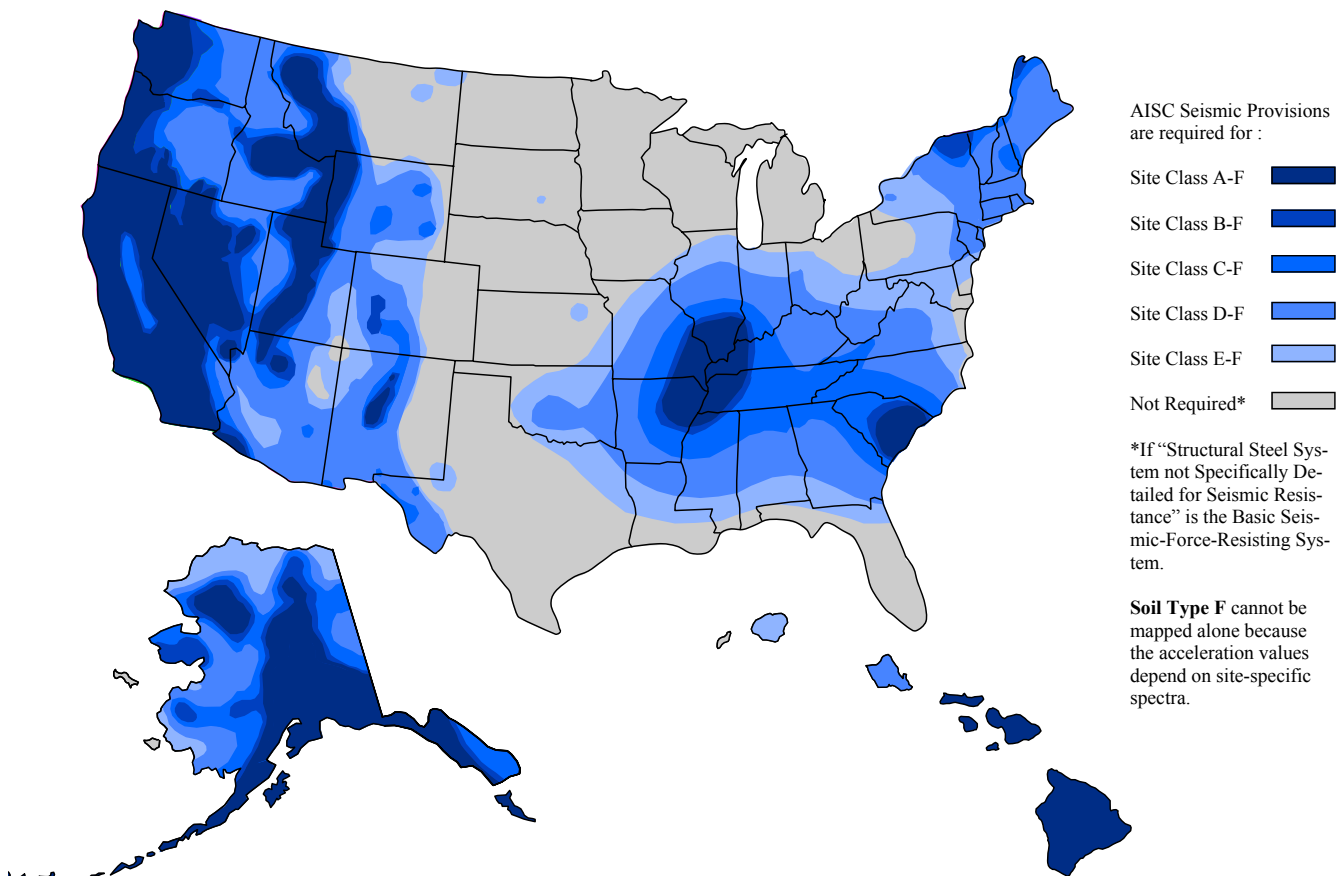


Figure 2: AISC Seismic Provision Requirements Summary for Seismic Use Group III